Preferably, the percentage by volume of the toughening additive in the final composite is more than 2%, more preferably, more than 5%, most preferably, more than 10%.

Preferably, the percentage by volume of the toughening additive in the final composite is not more than 30%, more preferably, not more than 25%, most preferably, not more than 20%. It is particularly preferred that the percentage toughening additive by volume in the final composite is not more than 15%.

The percentage by volume of structural fibres in the preform is preferably at least 65%. The minimum value of 65% ensures that there is sufficient structural fibres to give the required strength. Furthermore, the quantity of non-structural thermoplastic fibres in the preform is insufficient to allow direct conversion of the material into a fully consolidated thermoplastic composite by a thermal processing route. However the proportion of toughening fibres, that is, the thermoplastic fibres is high in comparison to known methods in which thermoplastic is added in particulate form and so the toughening effect is commensurately much greater than that achieved with those known methods.

Preferably, the melt temperature of the toughening additive is not the same as the curing temperature of the resin component. It can be between 80-350°C, more preferably between 100-250°C, but its final selection will depend upon the parameters of the base matrix material. Suitably it may be 20°C above the curing temperature although it has been found that with some materials, at least, it may actually be preferable for the thermoplastic fibres to melt.

The ability of the composite to be produced using a low viscosity resin will implicitly increase the rate at which a mould can be filled. However, the problem of controlling resin cure times remains. A key factor always in resin injection is ensuring that the resin fills the mould and wets the reinforcement totally before it cures. However fill time and cure time are linked and the resin

begins to cure as soon as it is mixed before injection, and this process continues throughout the injection cycle.

In a preferred embodiment, the injection and cure stages of the process are separated by removing curing agents from the resin formulation. A resin curing agent is instead added to the structural component prior to the injection of the resin component. Preferably, the curing agent is temperature activated. The curing agent may be added to the structural component by dispersion into the thermoplastic fibres.

It is now possible to obtain commercially, curing agents that are available in solid powder form and which only become active at a specific temperature. This capability particularly arises when the curing agent is encapsulated in a thermoplastic solid with a very specific melting temperature. The micronised curing agents may be dispersed in the structural reinforcement and the resin can then be injected hot without any risk of premature reaction. Resin cure can then be triggered when desired by simply raising the temperature to the critical temperature to activate the dispersed curing agents.

This embodiment allows curing of the resin prior to its addition to the structural component to be prevented. This avoids timing problems where the resin viscosity rises due to curing prior to its addition to the structural component or during the addition process. This provides a much greater degree of control over the processing and also provides more flexibility in terms of composite structures because lower viscosity resins provide less processing problems. For instance, composites with thick laminated structures may benefit whereas in prior art methods difficulties were experienced in providing sufficient resin in the middle layers and the areas of the layers furthest from the edges.

The temperature activated curing agents provide still greater control by providing the possibility of completing the resin addition prior to curing and then raising the temperature to activate curing once satisfactory mixing of resin and structural components has been accomplished. This curing

operation may be very rapid as high reactivity resins can be used and the thermoplastic fibres provide the ability to moderate an exothermic temperature rise. Furthermore it allows the possibility of improved quality assurance by enabling mould filling to be checked and rectified if in error without the concern that cure is already taking place.

Suitable resin curing temperatures, suitable curing agents for particular resins and temperatures, and melting points of thermoplastic polymers are well known to those of ordinary skill in the art.

A further preferred feature is the use of a textile veil as part of the preform by being sandwiched between layers of the structural component.

The veil, preferably has a greater absorbency rate than the structural component layer(s) either due to its thinness or the inherent absorbency or structure of the veil material or a combination of these characteristics. Accordingly, in some embodiments, it is preferred that a veil layer is provided sandwiched between the structural layers and provides means to increase the rate of infiltration of resin into the structure. Advantageously, by this means, the resin may be preferentially directed into the centre of thicker structures than has hitherto been possible.

A veil is a very fine layer of non-woven fibrous material which is typically produced by a paper making route. The veil will act to assist resin infiltration into the core of a preform by virtue of a greater resin absorbency rate than the rest of the preform. By sandwiching veils between layers of fabrics, resin may accordingly be directed into the centre of thick preforms more rapidly than has been possible hitherto. The veil will also act to provide selective toughening by being positioned at the interface between layers of fabrics which is a prime location for delamination in a composite part.

Preferably, the veil is a thin layer of fibres produced by a paper making route. Preferably, the veil is less than 100g/m^2, more preferably less than 50g/m^2, most preferably less than 30g/m^2. The veil will provide a combination of fibre bridging with yielding and crack deflection. The veil may